PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

ELECTRICAL CIRCUITS I W/LAB
EET 1012 (formerly EET 1010)

Class Hours: 3.0  Credit Hours: 3.0
Laboratory Hours: 3.0  Revised: Spring 05

Catalog Course Description:

An introductory course in DC and AC circuits. Topics include atomic structure, current and voltage, resistance and power. Ohm's Law and series and parallel circuits are covered. Transient response for capacitors and inductors are also discussed. The course includes fundamental AC concepts and phasor calculations for impedance, voltage, and current in RLC circuits. There will also be discussion of ladder logic and introduction to motors and transformers.

Entry Level Standards:

Students entering this course must have college-level math skills.

Prerequisites:

None

Corequisite:

MATH 1730

Textbook(s) and Other Course Materials:

Textbook:

References:
Electrical Circuit Analysis. Boylstadt

Parts Kit:
Approximate Cost: $10.00

Instructor’s Course Notes: Available on-line.

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture: Introduction to Electrical/Electronic Industry, units, atomic structure, current voltage, insulators, conductors and semiconductors, ammeters and voltmeters  &lt;br&gt;Lab: Introduction to lab and instrument measuring voltage and current with DMM and using Electronics Workbench EWB.</td>
</tr>
<tr>
<td>2</td>
<td>Lecture: Resistance, wire tables, temperature effects, color code, ohmmeters, Ohm’s Law, power, energy, efficiency, wattmeters, series circuits  &lt;br&gt;Lab: Series Circuits</td>
</tr>
<tr>
<td>3</td>
<td>Lecture: Series/parallel circuits, voltage, current law, equivalent resistance equations, internal resistance.  &lt;br&gt;Lab: Parallel Circuits breadboard and EWB.</td>
</tr>
</tbody>
</table>
Lecture: Series-parallel circuits. Analysis, applications. REVIEW and TEST  
Lab: Series-Parallel Circuits breadboard and EWB.

Lecture: Continuation of series-parallel circuits especially shorts and opens.  
REVIEW and TEST  
Lab: Continued Series-Parallel Circuits and introduction to the oscilloscope.

Lecture: Capacitance, electric field, dielectric strength, leakage current, transients, charging and discharging, energy  
Lab: Introduction RC transient circuits breadboard with oscilloscope and EWB.

Lecture: Continued transients in R-C circuits  
Lab: Capacitors - Charging and Discharging

Lecture: Continued transients in R-C circuits  
Lab: Capacitors - Charging and Discharging

Lecture: Inductance, Faraday’s Law, R-L transients, storage and decay cycles, steady state DC, RLC circuits. REVIEW AND TEST  
Lab: Inductors - Storage and Decay using EWB.

Lecture: AC fundamentals, frequency, period amplitude and phase relationships.  
Introduction to phasors degrees and radians  
Lab: AC fundamentals using the oscilloscope and EWB.

Lab: Impedance in AC circuits

Lecture: Power in AC circuits, apparent, real, reactive power and power factor. Also transformer basics.  
Lab: Series AC circuits

Lecture: Ohms law and AC series and parallel circuits, complex numbers. REVIEW and TEST  
Lab: Transformer basics

Lecture: Introduction to ladder logic and controls.  
Lab: Introduction to relays and control circuits.

FINAL EXAM

II. Course Objectives*:

A. Understand the nature of electricity and electronics as it has evolved. A, B, D, E

B. Have a conceptual knowledge of the nature of the atomic structure and how it relates to electrical materials and electrical operations. A, B, D, E

C. Understand the basic laws: Ohm’s Law, Kirchoff Voltage Law, and Kirchoff’s Current Law. A, B, D, E

D. Recognize series, parallel, series-parallel, multi-source, bridges, and other circuits. A, B, D, E

E. Solve DC circuits for complete solution. A, B, D, E

F. Know the nature of inductance and capacitance and understand their behavior in transient circuits. A, B, D, E

G. Be proficient in setting up any circuit studied in class as a laboratory experiment and make necessary voltage and current measurements. A, B, D, E
H. Use an oscilloscope to observe transients on R-L and R-C circuits. A, B, D, E
I. Use Electronics Workbench to solve any circuits studied. A, B, D, E
J. Understand basic electrical safety. A, I
K. Demonstrate, as an individual and as a team member, library/information skills, time management skills, problem-solving skills, material management skills, and communication skills. D, F, G, I, K

*Letters after course objectives reference EET Program Outcomes (as required by ABET).

III. Instructional Processes*:

Students will:

1. Participate in classroom discussions which challenge their abilities to think creatively and visualize complex spatial and mathematical relationships to solve problems. Mathematics Outcome

2. Work in teams to conduct laboratory experiments and also to solve special problem assignments. These activities are designed to foster interpersonal skills in teamwork and develop and enhance leadership skills, students' abilities to express ideas, and students' abilities to reach consensus solutions for the team through negotiation. Active Learning Strategy, Mathematics Outcome, Communication Outcome

3. Use electronic test equipment to test electrical circuits constructed from schematics in the laboratory and acquire data. Use computers with applications software to simulate, analyze, and predict the behavior of electrical circuits. Compare expected responses to experimental responses of electrical circuits. Use the Internet for special assignments such as locating data sheets on electronic components. Use computers with word processing software to prepare reports. Technological Literacy Outcome, Mathematics Outcome

4. Prepare reports on laboratory experiments which include methodology, mathematical analyses of electrical circuit models, a comprehensive comparison of calculated results with experimental results, and conclusions. Communication Outcome, Mathematics Outcome, Technological Literacy Outcome

5. Discuss the importance of personal qualities such as personal responsibility, time management principles, self-esteem, sociability, self-management, integrity and honesty in school and in the workplace, and dynamics of change in the workplace. Social and Behavioral Science Outcome, Transitional Strategy

*Strategies and outcomes listed after instructional processes reference TBR’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Begin to develop a sense of history concerning electricity and electronics. A
2. Use scientific and engineering notation and make unit conversions. A
3. Explain the Bohr Atom and the atomic nature of conductors, insulators, and semiconductors. B
4. Calculate the resistance of a wire, read the color code and use an ohmmeter. B
5. Apply Ohms Law quickly, knowing two of the three variables. C
6. Calculate power, energy and the cost of energy. C
7. Identify flawlessly when resistors are in series or parallel. D

8. Solve any DC series circuits for the voltage across and current through each resistor. (Complete Solution) E

9. Solve any DC parallel circuit for a complete solution. E

10. Solve any series-parallel DC circuit for a complete solution. E

11. Check any complete solution using Basic Laws and know if the solution is correct. E

12. Apply the Voltage Divider Equation and the Current Divider Equation to assist in the solution of series and parallel branches. E

13. Calculate the capacitance of a parallel plate capacitor. F

14. Define a generalized capacitor and relate to the parallel plate capacitor. F

15. Sketch or plot the voltage or current in RC transient circuits. F

16. State Faradays Law. F

17. Solve R-L transient circuits for storage and decay phases. F

18. Sketch or plot the voltage or current in R-L transient circuits. F

19. Use an oscilloscope to observe an RC transient by the slow time constant method or by repetitive switching. H

20. Use DC voltmeters and ammeter to measure the voltage and current in any DC circuit. G

21. Wire any circuit, steady state or transient. G

22. Use EWB to solve any DC circuit problems. I

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures: 80% of grade

Chapter Tests: 50%
Homework and Quizzes 10%
Final Exam 20%

B. Laboratory Expectations: 20% of grade

The laboratories for all Electrical Engineering Technology courses are an essential part of conveying the concepts to the student. The labs would closely follow the classes in content and in time of presentation so that the student is actually verifying these concepts to his or her self. The student will be able to apply the theory learned in class. The laboratory grade will be determined by a combination of performance within the lab and the quality and demonstrated comprehension of the lab report. There will be at least twelve labs during the semester to go along with the classroom material.

Performance in labs (subjective) 50%
Lab Reports (neatness and content) 30%
Laboratory Test 20%

C. Field Work:

N/A
D. Other Evaluation Methods:

N/A

E. Grading Scale:

A    93 - 100
B+   88 - 92
B    83 - 87
C+   78 - 82
C    70 - 77
D    60 - 69
F    Below 60

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent. Attendance is required to all lab sessions unless excused by the instructor. Students missing more than four unexcused sessions will receive an "F" and no credit will be received. Students tardy past half an hour will be considered absent.

B. Academic and Classroom Misconduct

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices: Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for Disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately (privately after class or in the instructor’s office). To request accommodations, students must register with Services for Students with Disabilities Office located in J.L. Goins Administration Building, Room 127 or 131 or by phone: (865) 539-7153 or (865) 694-6751 voice/TTD.